

1/2  
Title of the Device: Laser beam source

Utility Model Application No. 95190/1988 (Application  
date: July 18, 1988)  
Laid-Open No. 15762/1990 (Laid-Open date: January 31,  
1990)

Abstract

A thermistor 13 is arranged in the vicinity of a laser diode 11. The laser diode 11 and the thermistor 13 are operated by a constant current source 31. The temperature of the laser diode 11 is detected by the terminal voltage  $V_1$  of the thermistor 13. An operational amplifier (opamp) circuit 32 amplifies the voltage difference of the voltage of a variable resistor 36 corresponding to a standard temperature and the voltage  $V_1$  corresponding to the detected temperature of the laser diode 11. This differential amplifying voltage is applied to the opamp circuit 40 through a switching circuit 39. When the temperature of the laser diode 11 rises above the standard temperature, the arithmetic circuit 40 drives the cooling function of the Peltier device 19. In contrast to this, when the temperature of the laser diode 11 is lowered below the standard temperature, the arithmetic circuit 40 drives the heating function of the Peltier device 19. Thus, the temperature of the laser diode 11 is controlled. A comparing circuit 50 detects an abnormality

7/2

in the thermistor 13 in which the temperature of the laser diode 11 is lowered below a lower limit temperature determined by a first reference voltage, but because of an abnormality arising in the thermistor 13 the terminal voltage  $V_1$  is equal to or greater than the first comparing voltage. A comparing circuit 53 detects an abnormality of the thermistor 13 in which the temperature of the laser diode 11 is raised above an upper limit temperature determined by a second reference voltage but because of an abnormality in the thermistor 13 the terminal voltage  $V_1$  is equal to or less than the second comparing voltage. Each of the comparing circuits 50, 53 outputs a signal when they detect an abnormal state. Accordingly, a transistor 62 is turned off and a collector output rises, and the switching circuit 39 connects the input lead of the opamp circuit 40 to the ground. Thus, the operation of the Peltier device 19 using the opamp circuit 40 is stopped. This operation prevents the temperature of the laser diode 11 from swinging wildly because it is unnecessarily driven by the Peltier device 19 when ambient temperature rises or abnormality arises in the thermistor 13.